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Application Serial Number 10/046,632
Appeal Brief

**IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE**

Appl. No. : 10/046,632
Applicant(s): Albertus C. Den Brinker
Filed: January 14, 2002
TC/A.U.: 2600/2626
Examiner: V. Paul Harper
Atty. Docket: NL 010477
Title: Parametric Encoder and Method
For Encoding an Audio or Speech Signal

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On: 23 October 2006

By: 
William S. Francos

APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In connection with the Notice of Appeal Filed May 22,
2006, Applicants provide this Appeal Brief.

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TABLE OF CASES

1. Sensonics Inc. v Aerosonics Corp., 38 USPQ 2d 1551-1554 (CAFC 1996).
2. W.L. Gore & Associates, Inc. v. Garlock, Inc., 220 USPQ 303 (CAFC 1983).
3. Graham v. John Deere Co., 383 US 1, 148 USPQ 459 (CCPA 1966).
4. In re Bergel 130 USPQ 206 (CCPA 1961).
5. In re Sponnoble, 160 USPQ 237 (CCPA 1969).
6. Pro-Mold and Tool Co. v. Great Lakes Plastics, Inc. 37 USPQ2d 1626 (CAFC 1996).
7. Cardiac Pacemakers Inc. v. St. Jude Medical Inc. 72 USPQ 2d 1222 (CAFC 2004).

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1. Real Party in Interest

The real party in interest as assignee of the entire right and title to the invention described in the present application is Koninklijke Philips N.V. having a principle place of business at Groenewoudseweg 2, Eindhoven, The Netherlands.

2. Related Appeals and Interferences

There are no known related appeals or interferences at this time.

3. Status of the Claims

Claims 1-17 are pending in the present application and have been the subject of a Final Rejection.

The claims on appeal are duplicated in Appendix I.

4. Status of Amendments

A Final Office Action on the merits was mailed on March 1, 2006. In response thereto, a Reply traversing the substance of the final rejection was filed by facsimile on May 1, 2006. An Advisory Action was mailed May 16, 2006.

5. Summary of the Claimed Subject Matter¹

¹ In the description to follow, citations to various reference numerals, drawings and corresponding text in the specification are provided solely to comply with Patent Office Rules. It is emphasized that these reference numerals, drawings and text are representative in nature, and in not any way limiting of the true scope of the claims. It would therefore be improper to import any meaning into any of the claims simply on the basis of illustrative language that is provided here only under obligation to satisfy Patent Office rules for maintaining an Appeal.

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In accordance with a representative embodiment, a parametric encoder for encoding an audio or speech signal s into sinusoidal code data includes a segmentation unit (120) for segmenting the signal s into at least one single scale segment $x_m(n)$ with $m = 1 \dots M$ and for outputting the samples $x_m(0), \dots, x_m(L-1)$ of the segment $x_m(n)$. The parametric encoder also includes a sinusoidal estimation unit (140) for estimating the sinusoidal code data representing the segment $x_m(n)$ from the received samples $x_m(0), \dots, x_m(L-1)$. The segmentation unit (120) is further embodied for carrying out a frequency-warping operation in order to transform the output samples $x_m(0), \dots, x_m(L-1)$ onto a frequency-warped domain. Moreover, a post-processing filter (160) is provided for re-mapping the sinusoidal data output from the sinusoidal estimation unit (140) to an original frequency domain of the signal s . (Kindly refer to claim 1; Figs. 1-3; and page 3, line 29- page 6, line 18 of the filed application.)

In accordance with another representative embodiment, a method for encoding an audio or speech signals into sinusoidal code data includes segmenting the signal s into at least one single scale segment $x_m(n)$ with $m=1 \dots M$ having the samples $x_m(0), \dots, x_m(L-1)$. The method also includes estimating the sinusoidal code data representing the segment $x_m(n)$ from the received samples $x_m(0), \dots, x_m(L-1)$. In addition, a frequency-warping operation is carried out such that the samples $x_m(0), \dots, x_m(L-1)$ are provided on a frequency-warped domain. Moreover, the sinusoidal data being estimated on the frequency-warped domain are re-mapped to the original frequency domain of

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the signal s . (Kindly refer to claim 9; Figs. 1-3; and page 3, line 29-page 6, line 18 of the filed application.)

In accordance with yet another representative embodiment, a parametric encoder for encoding an audio or speech signal s into sinusoidal code data includes a segmentation unit adapted to segment the signal s into at least one single scale segment $x_m(n)$ with $m = 1 \dots M$ and for outputting the samples $x_m(0), \dots, x_m(L-1)$ of the segment $x_m(n)$. The parametric encoder also includes a sinusoidal estimation unit adapted to estimate the sinusoidal code data representing the segment $x_m(n)$ from the received samples $x_m(0), \dots, x_m(L-1)$; wherein the segmentation unit is adapted to carry out a frequency-warping operation in order to transform the output samples $x_m(0), \dots, x_m(L-1)$ onto a frequency-warped domain. Furthermore, the parametric encoder includes a post-processing filter (160) adapted to re-map the sinusoidal data output from the sinusoidal estimation unit (140) to the original frequency domain of the signal s . (Kindly refer to claim 10, Figs 1-3; and page 3, line 29-page 6, line 18 of the filed application.)

6. Grounds of Rejection to be Reviewed on Appeal

The issues in the present matter are whether:

I. Claims 1, 2, 3, 9, 10, 11 and 12 are properly rejected under 35 U.S.C. § 103(a) as being unpatentable over *Edler, et al.* ("Acoustic Coding Using Psychoacoustic Pre- and Post-Filter" in Proc. ICASSP-2000, 2000) in view of *Kleijn, et al.* ("Speech Coding and Synthesis" Elsevier Science, 1995).

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II. Claims 4,5,7,8,13,14,16 and 17 are properly rejected under 35 U.S.C. § 103(a) as being unpatentable over *Edler, et al.* and *Kleijn, et al.* in view of *Harma, et al.* ("Frequency-Warped Signal Processing for Audio Applications" J. Audio Eng. Sci. Vol. 11, No. 11, November 2000).

III. Claims 6 and 15 are properly rejected under 35 U.S.C. § 103(a) as being unpatentable over *Edler, et al.*, *Kleijn, et al.* *Harma, et al.* in view of *Oppenheim, et al.* ("Computation of Spectra with Unequal Resolution Using Fast the Fourier Transform" Proc. IEEE, Vol. 59, pp. 299-301).

7. Argument

I. Rejection of Claims 1, 2,3,9,10,11 and 12

a. The applied art fails to disclose at least a sinusoidal estimation unit adapted to estimate the sinusoidal code data

Analysis of obviousness under 35 U.S.C. §103 requires determination of the scope and content of the prior art, the differences between the prior art, and the claims at issue, and the level of ordinary skill in the pertinent art. *W.L. Gore & Associates, Inc. v. Garlock, Inc.* 220 USPQ 303, 311 (1983) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (CAFC 1966)). There must be content present in the prior art teachings to suggest to one skilled in the art that the claimed invention would have been obvious. *W.L. Gore & Associates* at 311 (citing *In re Bergel* 130 USPQ 206, 208 (CCPA 1961); and *In re*

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Sponnoble 160 USPQ 237, 244 (CCPA 1969)).

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is a reason, suggestion or motivation to do so. The reason, suggestion or motivation may come from references themselves; from knowledge of those skilled in art that certain references or disclosures in references are known to be of interest in the particular field; or from nature of the problem to be solved to do so found in the references themselves or in the knowledge generally available to one of ordinary skill in the art.

Pro-Mold and Tool Co. v. Great Lakes Plastics Inc. 37 USPQ2d 1626 (CAFC 1996). Prior knowledge in the field must be supported by tangible teachings in reference materials. *Cardiac Pacemakers Inc. v. St. Jude Medical Inc.* 72 USPQ 2d 1333, 1336 (CAFC 2004).

Relying upon hindsight knowledge of applicants' disclosure when the prior art does not teach nor suggest such knowledge results in the impermissible use of the invention as a template for its own reconstruction. *Sensonics Inc. v. Aerosonics Corp.*, 38 USPQ 2d 1551-1554 (CAFC 1996), citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.* 220 USPQ 303.

Claim 1 is drawn to a parametric encoder. The encoder includes a segmentation unit (120) for segmenting a signal into at least one scale segment and for outputting samples of the segment. The encoder also includes: a sinusoidal estimation unit (140) for estimating the sinusoidal code data representing said segment $x_m(n)$ from the received samples $x_m(0), \dots, x_m(L-1)$.

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Claim 10 is also drawn to a parametric encoder and includes: a sinusoidal estimation unit adapted to estimate the sinusoidal code data representing the segment $x_m(n)$ from the received samples $x_m(0), \dots, x_m(L-1)$

Claim 9 is drawn to a method and includes: estimating the sinusoidal code data representing said segment $x_m(n)$ from the received samples $x_m(0), \dots, x_m(L-1)$

Claims 1, 9 and 10 are the independent claims on Appeal.

In the filed application, a segmentation unit 120 segments a signal s into at least one single scale segment $x_m(n)$ with $m = 1 \dots M$, where m denotes a current downsampling step. The samples are input into a sinusoidal estimation unit 140 for *estimating the sinusoidal code data* representing the segment x_m .

The Office Action concedes that the reference to *Edler, et al.* does not disclose a sinusoidal estimation unit for estimating the sinusoidal code data representing the segment $x_m(n)$ from the received samples $x_m(0), \dots, x_m(L-1)$. The Examiner contends that this is known concept in the art as taught by *Kleijn, et al.*

The Examiner asserts that the disclosure of *Kleijn, et al.* includes the sinusoidal estimator as claimed. Applicants again respectfully disagree. The portion of *Kleijn, et al.*, section 8.2 is drawn to a description of a basic sinusoidal coder. (Kindly refer to the first line of the last paragraph of page 37 of the reference.) The reference notes that the spectrum of the speech signal is characterized by a sparse (complex or magnitude) spectrum. The sinusoidal coder of *Kleijn, et al.* is shown in Fig. 11.

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The speech signal according to the teachings of *Kleijn, et al.* is windowed with overlapping smooth windows. The complex spectrum for each of the windowed signals is obtained via a fast Fourier transform (FFT). The spectrum is separated into magnitude and phase spectra. The peaks of the magnitudes are determined and the rest of the spectrum is effectively set to zero. The magnitudes, phases and frequencies of the spectrum are quantized. The quantization indices are then transmitted to a decoder for reconstruction of the spectrum.

Thus, a ***coding sequence*** is described in the portion of the reference to *Kleijn, et al.* relied upon in the Office Action. The reference does not teach or suggest the claimed ***estimating the sinusoidal code data***, but rather the generation of sinusoidal code from a signal.

In the Advisory Action, the Examiner points to Applicants disclosure in the filed application that the 'estimation may be done by carrying out a fast Fourier transformation...' The Examiner also points out that Applicants note that the applied reference to *Kleijn, et al.* discloses taking a Fourier transform. Then, the Examiner alleges that "since the transform is performed by an algorithm that can have varying degrees of accuracy it is very common to refer to the resulting spectrum as an estimation (which indeed it is)."

First, Applicants respectfully submit that the Examiner has provided no citation in the applied art that the transform is an algorithmic estimation, or that the resulting spectrum is referred to very commonly as an estimation. As noted in *Cardiac Pacemakers Inc. v. St.*

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Jude Medical Inc. referenced above: Prior knowledge in the field must be supported by tangible teachings in reference materials. The Examiner provides no tangible substantiation that the noted assertions are known in the field. Accordingly, a rejection maintained based on such unsubstantiated assertions is not proper.

Moreover, the taking of a fast Fourier Transform (FFT) as disclosed in *Kleijn, et al.* relates to sinusoidal coding, and not to estimating sinusoidal code data as specifically claimed. There is no teaching of the claimed estimating or of the claimed sinusoidal estimation unit. Respectfully, given the lack of disclosure in the applied art, and the unsubstantiated assertions of the Examiner, Applicants submit that the Examiner is applying hindsight knowledge of Applicants' invention and attempting to garner features from the applied art, which are not found therein. As set forth in *Sensonics Inc. v Aerosonics Corp.*: Relying upon hindsight knowledge of applicants' disclosure when the prior art does not teach nor suggest such knowledge results in the impermissible use of the invention as a template for its own reconstruction. Thus, the rejection is improper and should be withdrawn.

Claims 9 and 10 include features, described above, that are similar to the features of claim 1 discussed at length above. Applicants respectfully submit that claims 8 and 10 are patentable at least for the reasons claim 1 is patentable over the applied art.

Claims 2-8 and 11-17 depend from claims 1 and 10, respectively. For at least the reasons set forth above, claims 1 and 10 are patentable over the applied art. Thus,

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at least because of their dependence on claim 1 and 10, claims 2-8 and 11-17 are patentable over the applied art.

II. Rejection of Claims 4,5,7,8,13,14,16 and 17

The rejection of claims 4,5,7,8,13,14,16 and 17 is respectfully traversed. These claims depend from one of claims 1 or 10, which are patentable for at least the reasons set forth above. Thus, claims 4,5,7,8,13,14,16 and 17 are patentable over the applied art for at least the reasons discussed above.

III. Rejection of Claims 6 and 15

The rejection of claims 6 and 15 is respectfully traversed. These claims depend from one of claims 1 or 10, which are patentable for at least the reasons set forth above. Thus, claims 6 and 15 are patentable over the applied art for at least the reasons discussed above.

Conclusion

In view of the foregoing, Applicant respectfully requests that the objections and rejections of record be withdrawn, and all pending claims be allowed. If any remaining issues can be resolved through a personal or telephonic interview, the Examiner is invited to contact the undersigned at the telephone number listed below.

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Respectfully submitted on behalf of:
Koninklijke Philips N.V.



by: William S. Francos (Reg. No. 38,456)

Date: October 23, 2006

Volentine, Francos & Whitt, PLLC
Treeview Corporate Center
Two Meridian Blvd.
Wyomissing, PA 19610
(610) 375-3513 (v)
(610) 375-3277 (f)

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APPENDIX
Claims on Appeal

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Claims on Appeal:

1. A parametric encoder for encoding an audio or speech signals s into sinusoidal code data, comprising:
 - a segmentation unit (120) for segmenting said signal s into at least one single scale segment $x_m(n)$ with $m = 1 \dots M$ and for outputting the samples $x_m(0), \dots, x_m(L-1)$ of said segment $x_m(n)$; and
 - a sinusoidal estimation unit (140) for estimating the sinusoidal code data representing said segment $x_m(n)$ from the received samples $x_m(0), \dots, x_m(L-1)$);
 characterized in that
 - the segmentation unit (120) is further embodied for carrying out a frequency-warping operation in order to transform the output samples $x_m(0), \dots, x_m(L-1)$ onto a frequency-warped domain; and
 - a post-processing filter (160) is provided for re-mapping said sinusoidal data output from the sinusoidal estimation unit (140) to an original frequency domain of the signal s .

2. The parametric encoder according to claim 1, characterized in that the segmentation unit (120) comprises
 - a plurality of $L-1$ filters (122_1, ... 122_L-1) being connected in series for receiving the signal $s(n)$ at the input of the first of said filters (122_1); and
 - a sampling unit (124) for receiving and sampling said signal $s(n)=y_0(n)$ as well as the output signals
 - $y_1(n) \dots y_{L-1}(n)$ of said $L-1$ filters (122_1, ... 122_L-1) in order to generate L samples $x_m(0), \dots, x_m(L-1)$
 or

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$x_m^0(0), \dots, x_m^0(L-1)$ of the segment x_m .

3. The parametric encoder according to claim 2, characterized in that at least some of the filters (122_1, ... 122_L-1) are embodied as all-pass filters.

4. The parametric encoder according to claim 3, characterized in that the some filters (122_1, ... 122_L-1) are embodied as first-order all-pass filters each having a transfer function $A(z)$ according to:

$$A(z) = \frac{-\lambda^* + z^{-1}}{1 - \lambda z^{-1}},$$

wherein λ^* denotes a complex-conjugation and wherein λ is preferably real valued.

5. The parametric encoder according to claim 4, characterized in that all of the filters (122_1, ... 122_L-1) out of the plurality of filters are embodied as first-order all-pass filter, each having a transfer function $A(z)$ according to:

$$A(z) = \frac{-\lambda^* + z^{-1}}{1 - \lambda z^{-1}},$$

wherein λ^* denotes a complex-conjugation and wherein λ is preferably real valued.

6. The parametric encoder according to claim 4, characterized in that the first filter (122_1) in said

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series connection receiving the signal $s(n)$ has a transfer function $A_0(z)$ according to:

$$A_0(z) = \frac{1}{1 - \lambda z^{-1}},$$

the second filter (122_2) in said series connection following said first filter (122_1) has a transfer function $A_1(z)$ according to:

$$A_1(z) = \sqrt{1 - |\lambda|^2} \frac{z^{-1}}{1 - \lambda z^{-1}}, \text{ and}$$

the remaining filters (122_3...122_L-1) each are first order all-pass filters having a transfer function $A(z)$ according to claim 4.

7. The parametric encoder according to claim 2, characterized in that

- in the segmentation unit (120) the plurality of L-1 filters (122_1, ... 122_L-1) being connected in series is embodied as tapped delay-line with each of the filters having a transfer function of $A(z) = z^{-1}$; and
- there is additionally provided a bi-lateral warping unit (126) for transforming the samples on the original frequency-domain of the signal s $x_m^o(-N_1), \dots, x_m^o(N_2)$ output by the sampling unit (124) into transformed samples $x_m(-M_1), \dots, x_m(M_2)$ on a frequency-warped domain by applying a bi-lateral frequency-warping operation to the samples $x_m^o(-N_1), \dots, x_m^o(N_2)$ and for outputting the transformed samples $x_m(-M_1), \dots, x_m(M_2)$ to said sinusoidal estimation unit (140).

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8. The parametric encoder according to claim 7, characterized in that the bi-lateral warping unit (126) carries out the transformation of the samples x_m^0 into the samples x_m according to:

$$\begin{pmatrix} \vdots \\ x_m(-n) \\ \vdots \\ x_m(-1) \\ x_m(0) \\ x_m(1) \\ \vdots \\ x_m(n) \\ \vdots \end{pmatrix} = \begin{pmatrix} \vdots & \vdots \\ q(n, N_1) & \dots & q(n, 1) \\ \vdots & \vdots \\ q(1, N_1) & \dots & q(1, 1) \\ q(0, N_1) & \dots & q(0, 1) & 1 & q(0, 1) & \dots & q(0, N_2) \\ & & & & q(1, 1) & \dots & q(1, N_2) \\ & & & & \vdots & & \vdots \\ & & & & q(n, 1) & \dots & q(n, N_2) \\ & & & & \vdots & & \vdots \end{pmatrix} \begin{pmatrix} x_m^0(-N_1) \\ \vdots \\ x_m^0(-1) \\ x_m^0(0) \\ x_m^0(1) \\ \vdots \\ x_m^0(N_2) \end{pmatrix}$$

wherein q columnwise represents the impulse responses of the tapped line of all-pass filters (122_1 ... 122_L-1).

9. A method for encoding an audio or speech signals into sinusoidal code data, comprising the steps of:

- segmenting said signal s into at least one single scale segment $x_m(n)$ with $m=1 \dots M$ having the samples $x_m(0)$, ..., $x_m(L-1)$; and
- estimating the sinusoidal code data representing said segment $x_m(n)$ from the received samples $x_m(0)$, ..., $x_m(L-1)$;

characterized in that

- a frequency-warping operation is carried out such that the samples $x_m(0)$, ..., $x_m(L-1)$ are provided on a frequency-warped domain; and

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- said sinusoidal data being estimated on the frequency-warped domain are re-mapped to the original frequency domain of the signal s .

10. A parametric encoder for encoding an audio or speech signal s into sinusoidal code data, comprising:

- a segmentation unit adapted to segment the signal s into at least one single scale segment $x_m(n)$ with $m = 1 \dots M$ and for outputting the samples $x_m(0), \dots, x_m(L-1)$ of the segment $x_m(n)$; and
- a sinusoidal estimation unit adapted to estimate the sinusoidal code data representing the segment $x_m(n)$ from the received samples $x_m(0), \dots, x_m(L-1)$; wherein the segmentation unit is adapted to carry out a frequency-warping operation in order to transform the output samples $x_m(0), \dots, x_m(L-1)$ onto a frequency-warped domain; and
- a post-processing filter adapted to re-map the sinusoidal data output from the sinusoidal estimation unit (140) to the original frequency domain of the signal s .

11. The parametric encoder according to claim 10, wherein the segmentation unit comprises:

- a plurality of filters connected in series for receiving the signal $s(n)$ at the input of the first of the filters; and
- a sampling unit adapted to sample and receive the signal $s(n)=y_0(n)$ as and the output signals $y_1(n) \dots y_{L-1}(n)$ of the plurality of filters in order to generate L samples $x_m(0), \dots, x_m(L-1)$ or $x_m^0(0), \dots, x_m^0(L-1)$ of the segment x_m .

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12. The parametric encoder according to claim 11, wherein at least some of the filters are embodied as all-pass filters.

13. The parametric encoder according to claim 12, wherein some of the plurality of filters are embodied as first-order all-pass filters each having a transfer function $A(z)$ according to:

$$A(z) = \frac{-\lambda^* + z^{-1}}{1 - \lambda z^{-1}},$$

wherein λ^* denotes a complex-conjugation and wherein λ is preferably real valued.

14. The parametric encoder according to claim 13, wherein all of the plurality of filters are embodied as first-order all-pass filter, each having a transfer function $A(z)$ according to:

$$A(z) = \frac{-\lambda^* + z^{-1}}{1 - \lambda z^{-1}},$$

wherein λ^* denotes a complex-conjugation and wherein λ is preferably real valued.

15. The parametric encoder according to claim 13, wherein a first filter in the series connection receiving the signal $s(n)$ has a transfer function $A_0(z)$ according to:

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$$A_0(z) = \frac{1}{1 - \lambda z^{-1}},$$

a second filter in the series connection following the first filter has a transfer function $A_1(z)$ according to:

$$A_1(z) = \sqrt{1 - |\lambda|^2} \frac{z^{-1}}{1 - \lambda z^{-1}}, \text{ and}$$

the remaining filters each are first order all-pass filters having a transfer function.

16. The parametric encoder according to claim 11, wherein
- in the segmentation unit the plurality of filters being connected in series is embodied as tapped delay-line with each of the filters having a transfer function of $A(z) = z^{-1}$; and

- a bi-lateral warping unit adapted to transform the samples on the original frequency-domain of the signal s $x_m^o(-N_1), \dots, x_m^o(N_2)$ output by the sampling unit into transformed samples $x_m(-M_1), \dots, x_m(M_2)$ on a frequency-warped domain by applying a bi-lateral frequency-warping operation to the samples $x_m^o(-N_1), \dots, x_m^o(N_2)$ and for outputting the transformed samples $x_m(-M_1), \dots, x_m(M_2)$ to the sinusoidal estimation unit.

17. The parametric encoder according to claim 16, wherein the bi-lateral warping unit is adapted to carry out the transformation of the samples x_m^o into the samples x_m according to:

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$$\begin{pmatrix} \vdots \\ x_m(-n) \\ \vdots \\ x_m(-1) \\ x(0) \\ x(1) \\ \vdots \\ x_m(n) \\ \vdots \end{pmatrix} = \begin{pmatrix} \vdots & & \vdots \\ q(n, N_1) & \cdots & q(n, 1) \\ \vdots & & \vdots \\ q(1, N_1) & \cdots & q(1, 1) \\ q(0, N_1) & \cdots & q(0, 1) & 1 & q(0, 1) & \cdots & q(0, N_2) \\ & & & & q(1, 1) & \cdots & q(1, N_2) \\ & & & & \vdots & & \vdots \\ & & & & q(n, 1) & \cdots & q(n, N_2) \\ & & & & \vdots & & \vdots \end{pmatrix} \begin{pmatrix} x_m^0(-N_1) \\ \vdots \\ x_m^0(-1) \\ x_m^0(0) \\ x_m^0(1) \\ \vdots \\ x_m^0(N_2) \end{pmatrix}$$

wherein q columnwise represents the impulse responses of the tapped line of all-pass filters.

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APPENDIX

Evidence

(None)

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APPENDIX

Related Proceedings

(None)

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